PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH COLUMBIA

Ingenika River Prescribed Burn, 2000

F. B. Corbould
December 2000

PWFWCP Report No. 234

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The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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1.0 Introduction

Since the 1970s, fire suppression of wildfires has been an active management tool used by the Ministry of Forests [MoF] in order to conserve merchantable timber within managed forests of the Williston Reservoir watershed. Thus, most areas that were historically maintained in a grass and shrub community by wildfires are now advancing into more mature structural stages (e.g., pole sapling), making them less suitable for early seral-dependent wildlife species. This is of particular concern for areas that provide ungulate winter range in conifer-dominated landscapes. Consequently, to enhance habitats for grazing and browsing ungulates such as elk (*Cervus elaphus nelsonnii*) and moose (*Alces alces*), the Peace/Williston Fish and Wildlife Compensation Program [PWFWCP] has performed prescribed burning in the Finlay River drainage since 1989. Burns have been conducted in tributary drainages to the Finlay River proper and adjacent to the Finlay Reach of the Williston Reservoir: Bevel (1989 and 1991), Ospika (1990), Akie (1990 and 1991), Pesika (1993), and Pelly (1993) (Zemlak et al. in prep). In 1996, a site along the Ingenika River drainage was proposed.

In the early and mid-part of the past century, wildfires occurred on a fairly regular basis (15-30 year interval) in the lower Ingenika River drainage, thereby maintaining much of the area in an early seral community. Hence, with its accumulated snow depths rarely exceeding 60 cm (Corbould and Martin in prep, PWFWCP unpublished data), the lower Ingenika River drainage has the capability of providing some of the best low-elevation ungulate winter range in the Finlay River drainage; the area proposed for burning has a high habitat capability rating for elk and moose (Ministry of Environment, Lands and Parks unpublished data).

The objective of the burn at the Ingenika site is to convert approximately 30% to 70% of the proposed area back into an early seral community (grass and shrub), thus improving the habitat suitability of the site for early seral-dependent wildlife species. In particular, burning is intended to enhance the area for a small resident population of Rocky Mountain elk residing in the lower Ingenika and Finlay drainage that was supplemented with an additional 49 animals in February 1996 by the PWFWCP (Hengeveld and Wood 2000). By creating more extensive open habitats along the south-facing slopes, other wildlife that use the area such as blue grouse (*Dendragapus obscurus*), black bears (*Ursus americanus*), and woodland caribou (*Rangifer tarandus*) will also benefit. These slopes provide one of the few locations in the Williston Reservoir watershed where blue grouse utilise low-elevation habitats.

In May 2000, a prescribed burn was conducted on a portion of the proposed area. This report documents the prescribed burning activities that occurred in 2000 and activities that have been involved with the Ingenika burn since it was first proposed in 1996.

2.0 Area Description

The proposed Ingenika prescribed burn site is located along the north shore of the Ingenika River, Williston Reservoir watershed (Figure 1). The site is situated on the southern facing slopes between Ingenika Crag (Grassy Bluff) and Pelly Creek. As a result of prior wildfires in 1955 and 1970, the forest composition of the site consisted of regenerating stands (20-40 years old) of lodgepole pine (*Pinus contorta contorta*) and trembling aspen (*Populus tremuloides*), with pockets of mature (80 years old and older) lodgepole pine, hybid white spruce (*Picea glauca x engelmannii)*, and trembling aspen (Appendix A). The Ingenika site is located within the dry cool Boreal White and Black Spruce biogeoclimatic subzone (BWBSdk1; MacKinnon et al. 1990), Cassiar Ranges Ecosection (Demarchi 1995), and Mackenzie Forest District [MFD].

The proposed burn area extends from 740 m to 1,260 m in elevation and has moderate slopes (20-40%) with some small benches and intermittent creek draws (Figure 2). Following the creation of a machinery-made fire break around the proposed burn perimeter (13.0 km) in May 2000, the area scheduled to be burned was reduced to 918 ha. In order to facilitate burning of different portions of the proposed area, a 3-km fire break was also established through its central region, thus creating eastern (Phase I – 524 ha) and western (Phase II – 394 ha) sections. An existing, old logging road acted as a fire break for 4.2 km along the southern boundary of Phase I and part of Phase II. Helicopter landing sites were established at numerous locations along the fire break.

Light fuel loading (i.e., primarily leaf litter) was present in the purer aspen stands (mainly Phase I) and moderate to heavy fuel loading was present in areas of pine regeneration due to downed stems from the previous wildfires (mainly Phase II).

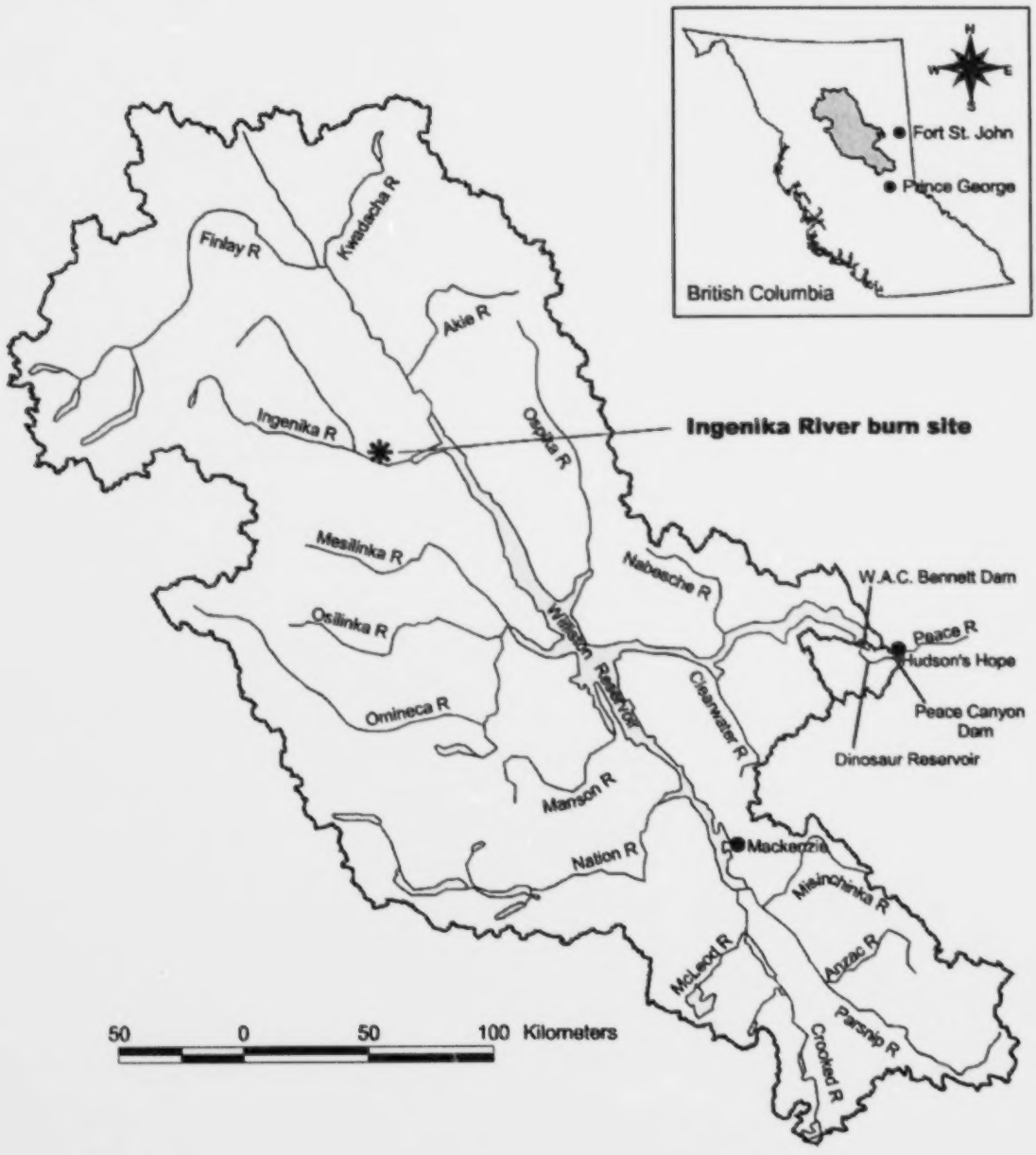


Figure 1. Ingenika River burn site, Williston Reservoir watershed, May 2000.

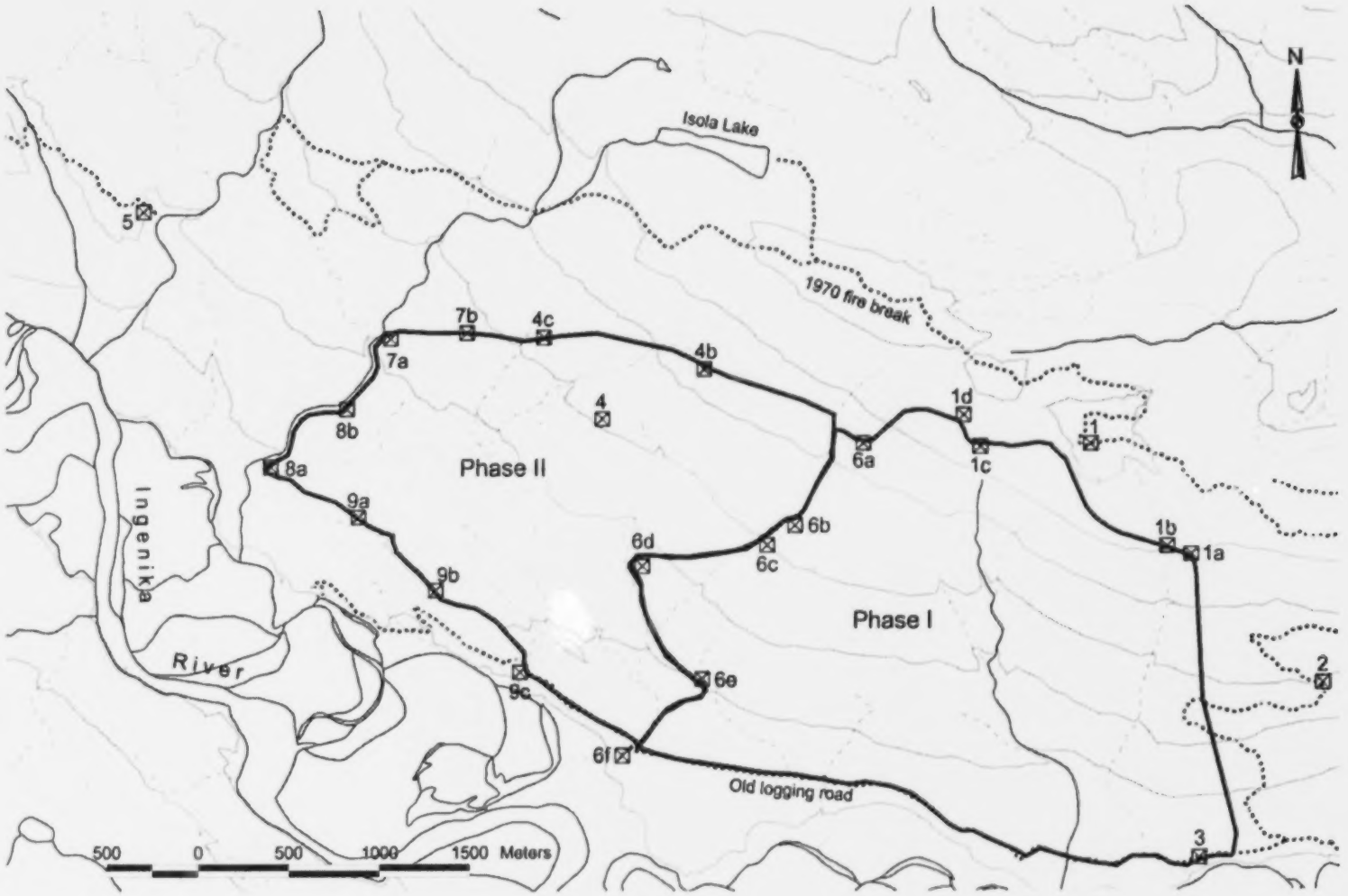


Figure 2. Ingenika River prescribed burn site, May 2000: eastern (Phase I) and western (Phase II) sections.

3.0 Pre-2000 Project Activities

Prescribed burning that is carried out by the PWFWCP is conducted under the auspices of the Ministry of Environment, Lands and Parks (MELP) and is therefore governed by the protocol agreement between MELP and MoF regarding the use of prescribed fire for wildlife habitat improvement. Consequently, MoF participates in the implementation and monitoring of burns that PWFWCP (i.e., MELP) propose for wildlife habitat enhancement. In addition, prior to a burn receiving approval, MoF reviews submitted burn proposals to identify and ensure that any concerns regarding timber values and fire management are addressed; MoF is responsible (financially and operationally) for the suppression of any fires that escape the area proposed to be burned by MELP or the predetermined area of responsibility.

A prescribed burn proposal for the Ingenika River site was first submitted to MoF (MFD) in February 1996. In May, a meeting was held with MELP, MoF (MFD) and PWFWCP personnel to discuss requirements under the MELP/MoF protocol agreement and the objectives of the proposed burn. A pre-burn field inspection of the Ingenika site was then conducted with representatives from all agencies plus MoF (Prince George Region) to identify areas of concern, potential control measures required, and agree on the burn perimeter. A burn was scheduled for May 1996 but was cancelled due to poor weather and ground conditions and newly identified requirements requested by MoF (MFD)[1].

In 1997, a prescribed burn proposal was again submitted to MoF (MFD). A pre-burn survey of the site was conducted with PWFWCP and MoF (MFD) staff in April and a remote weather station was established nearby in early May. Following the pre-burn survey, it was jointly agreed that the proposed burn area be reduced from 2,450 ha to approximately 1,000 ha as the eastern, western and northern boundaries were redefined. MoF (MFD) also requested that a hand-tool fire break be established along the new eastern flank of the proposed burn area and that helicopter landing sites be built. In addition, in consultation with MoF's Prince George Fire Centre [PGFC], a more detailed burn proposal (Prescribed Burn Plan, FS117 form) was prepared and re-submitted to MoF (MFD) for approval. Due to insufficient time to establish the fire break and less than favourable spring burning conditions, the prescribed burn was cancelled for the year. However, 5 helicopter landing sites were built and approximately half of the 2-km hand-tool fire break along the eastern flank were established in early fall to help prepare for the following spring burning season. Assessments (i.e., multiple vegetation macroplots and pellet

[1] MoF (MFD) requested that PWFWCP develop a prescribed burn plan that identifies all proposed burning activities in the MFD for the next 5 years so that these activities could be co-ordinated with other landscape level planning processes. A draft 5-year plan was developed by January 1997.

count surveys) were also conducted in 2 areas of the proposed burn in order to characterise the vegetation and ungulate use prior to burning.

In early spring 1998, an FS117 form was again submitted to MoF (MFD), the remote weather station was re-established, and a pre-burn survey of the site was conducted. No burn was attempted as burning conditions were unsuitable. Since the burn was not able to be conducted, the remainder of the 2-km hand-tool fire break was not completed until the fall so that no vegetation would invade the break prior to the next year's scheduled burn.

Activities in spring 1999 included submitting the FS117 form to MoF (MFD), re-establishing the remote weather station, and conducting a pre-burn survey of the site. In 1999, however, PGFC (i.e., Protection Branch of MoF) took over responsibility of approving any prescribed burning plans from a fire management perspective; MoF (MFD) still reviewed plans but their responsibility was limited to identifying concerns regarding timber values within the MFD. In order to reduce the chance of fire escape and protect valued stands of timber adjacent to the proposed burn area, the PGFC requested that a more extensive fire break (e.g., created by heavy machinery) be established around the entire proposed burn perimeter. An old machinery-made fire break, established to help control the 1970 wildfire, already encompassed the proposed burn area (Figure 2, Appendix A) but was considered not suitable as a control measure as it had valued timber within its boundaries, was situated in areas not always favourable to controlling the proposed burn, and had become overgrown with vegetation. Although plans were made to construct the new fire break and burn in May, the machinery scheduled to conduct the work broke down enroute to the site, thereby postponing both activities until May 2000.

Each year burn proposals were submitted, local stakeholders (Tsay Keh Dene and area guide-outfitter) were contacted and asked for comments concerning the proposed burn; all questions or concerns that were put forth were answered to the submitter's satisfaction.

Since 1996, supplementary financial support for the project has been requested and received from the Habitat Conservation Trust Fund [HCTF]. From 1996 to 1998, financial support was provided to assist with all aspects of proposed project activities: burn and site preparations, fire ignition, fire mop-up, and vegetation and wildlife use assessments. In 1999, financial assistance from HCTF was reduced to a contingency basis whereby funding support would only be needed if extensive fire mop-up activities were required; this was made possible because PWFWCP assumed full responsibility for expenditures involved with preparing for and conducting the burn and post-burn assessments. Since no prescribed burning was conducted from 1996 to 1999, expenditures only pertained to preparatory activities, which totalled $39,042 (PWFWCP $21,922

and HCTF $17,120). A request for contingency funding support for the proposed upcoming spring burn was again submitted to HCTF in the fall of 1999.

4.0 2000 Project Activities

In April 2000, a Prescribed Burning Plan (FS117 form) was submitted to PGFC and MoF (MFD) for their review. Pre-burn surveys of the site were conducted on 13 and 26 April and the remote weather station was re-established on 13 April. Local stakeholders were contacted and new concerns put forth were addressed. Also, arrangements were made to ensure that Tsay Keh Dene members, who were to be contracted to assist with project activities, received their annual fire suppression re-certification training.

Discussions were held with PGFC to further define each agencies' area of responsibility and discuss the submission of a new burn plan (Range Enhancement Burn Plan) requested. Previous burn plans (jointly agreed upon) identified that PWFWCP was responsible for fire mop-up and control activities up to a maximum of 50 m outside the proposed burn boundary. However, because defining this boundary in the field would be difficult, PGFC requested that PWFWCP's area of responsibility (AoR) be extended out to the 1970 fire break on the eastern and northern perimeter, down to the Ingenika River on the southern perimeter, and to the west side of the creek draw that borders the west flank of Phase II (Appendix A). PWFWCP agreed to the request with the caveat that if fire did exit the proposed burn perimeter in certain locations (e.g., between the southern perimeter and Ingenika River) that it would be monitored but not actively suppressed unless it had the potential to carry further and threaten the AoR perimeter. A completed Range Enhancement Burn Plan was subsequently submitted.

As requested in 1999 by PGFC, a Caterpillar 527 tractor was hired to construct a fire break around the proposed burn site. The layout and establishment of the fire break was conducted between 4 and 16 May; poor weather conditions that restricted access to the site negated work being conducted from the 8 to 11 May. The perimeter of Phase I (10.4 km including the 3.0 km east-west divide) was established first, being completed on 13 May and taking 28.0 hours; only 7.0 km were newly ploughed as the 3.4-km southern boundary was the old logging road. The fire break around Phase II (4.8 km, excluding 3.0-km east-west divide and 0.8-km section of old logging road) was completed on the morning of 16 May after 31.5 hrs of work. The new enclosed burn area was 918 ha in size with a perimeter of 13.0 km. Larger clearings were created at numerous locations along the fire break to act as helicopter landing sites (Appendix C).

In preparation for a scheduled ignition of Phase I in the afternoon of 14 May (based on site conditions and spot weather forecasts for the area), on the 13 and 14 May the fire crew moved equipment and supplies from the MoF tanker base to the site of base operations along the Ingenika River (Rob Johnson's residence). Four drums of incinerant[2] were prepared for the aerial drip torch that would be used to ignite the burn; a drip torch superseded the use of an aerial ignition devices (AIDs) machine in order to provide a greater intensity of heat to ignite ground fuels. The weather station was visited daily to monitor and record up-to-date weather conditions (Appendix B). All crew and equipment were ready and prepared for a late afternoon ignition time but the burn was postponed because the helicopter was sequestered for a search and rescue operation at 16:00 hr PST.

On 15 May, although burn indices were not optimal (Appendix B), ignition of Phase I was initiated at 17:00 hr PST in an attempt to black-line the fire break where potentially more volatile fuels were situated (e.g., leaf litter in aspens stands along east and northeast perimeter) and where there were areas of concern (northwest corner). After dispensing 2 drums of incinerant and having very limited response, ignition attempts were halted.

Burning was again attempted on 16 May. Fire ignition was initiated at about 15:30 hr PST on Phase I, with a concentration on aspen-dominated areas. After dispensing a few drums of fuel on the eastern half of Phase I, a slightly better burn response resulted with some convection occurring. A concerted attempt was then made to burn the western portion of Phase I but, even though the initial ignition appeared to be good and seemingly large quantities of incinerant were dropped, very little fire spread occurred. By 18:00 hr PST, slight down-slope winds had begun thereby counteracting any convection winds that had occurred. Attempts were made to black-line the southern and southwestern perimeter of Phase II (primarily aspen) but limited success occurred. Ignition attempts were stopped at about 19:30 hr PST. Five drums of incinerant were utilised on 16 May.

When the site was surveyed on 17 May, only 2 small areas in the southeast corner of Phase I required any mop activities. The fire had circumvented the old logging road in one location and the fire break in another. Although they posed little threat to any serious advancement, these areas were thoroughly extinguished by dropping bucket loads of water from the helicopter to ensure no further problems arose; one tree that was smouldering at its base was knocked over by the tractor prior to being dowsed with water. Prior to leaving the area, the tractor altered key locations at the bottom of the east-west divide and the eastern boundary of Phase I in order to

[2] The incinerant was the product of mixing petrol gel (mixture of liquid methyl hydrate and crystal Sure Fire™) to

negate the use of the fire break by motorised vehicles (e.g., all terrain vehicles and snowmobiles).

PGFC staff monitored the site on 18 May and only observed a few localised spots within the Phase I perimeter that were still emitting smoke. No smoke was observed from the burn site on 19 May. In the afternoon of 20 May, local residents reported that the fire was advancing up the eastern flank of Phase I when wind gusts occurred. From 20 to 28 May, Johnny Pierre (fire warden for Tsay Keh Dene unit crew) periodically monitored the status of the burn and reported to PWFWCP. On the 21 May, rain and colder temperatures occurred and no smoke was observed; no smoke was reported after 20. On 1 June, PWFWCP and PGFC personnel conducted aerial infrared scanning of the site and observed no sources of heat.

An estimated 75 to 100 ha was burned with the majority occurring in the eastern section of Phase I, consisting of regenerating stands of aspen and open, drier slopes. Some smaller patches (up to about 1 ha in size) did burn within Phase II and the western portion of Phase I. Ground fuels under the younger, monotypic pine stands were apparently insufficient to ignite the suspended woody fuel or to ladder the fire into the lodgepole pine foliage, thus not allowing the fire to carry better and burn larger areas.

Due to the limited success of this burn, no vegetation or wildlife use assessments will be conducted.

All costs ($50,292 excluding PWFWCP and MoF wages) incurred during the preparation and execution of the 2000 prescribed burn were borne by the PWFWCP. A total of $89,334 has now been spent on the project since 1996, resulting in a cost of about $900-1,200 for every hectare burned.

200-litre drums of fuel (in our case, Jet B fuel).

5.0 Acknowledgements

I would first like to thank Rob Johnson and his family for allowing PWFWCP to base our prescribed burning activities from their residence along the Ingenika River. The Ministry of Forests provided staffing to assist with the Ingenika burn, as well as fire suppression equipment, several drums of old fuel for fire ignition, and an infrared scanner. Gordon Haley (MFD) provided technical expertise to conduct the infrared scanning and Brian Bissett (MFD) downloaded and provided data from our remote weather station. Lastly, I would especially like to thank Dennis Nesbit (PGFC) and Chris Duffy (PGFC) for helping me finally get some heat to the ground at Ingenika, albeit to limited success.

6.0 References

Demarchi, D.A. 1995. Ecoregions of British Columbia, 4th edition. British Columbia Ministry Of Environment, Lands and Parks, Victoria, B.C.

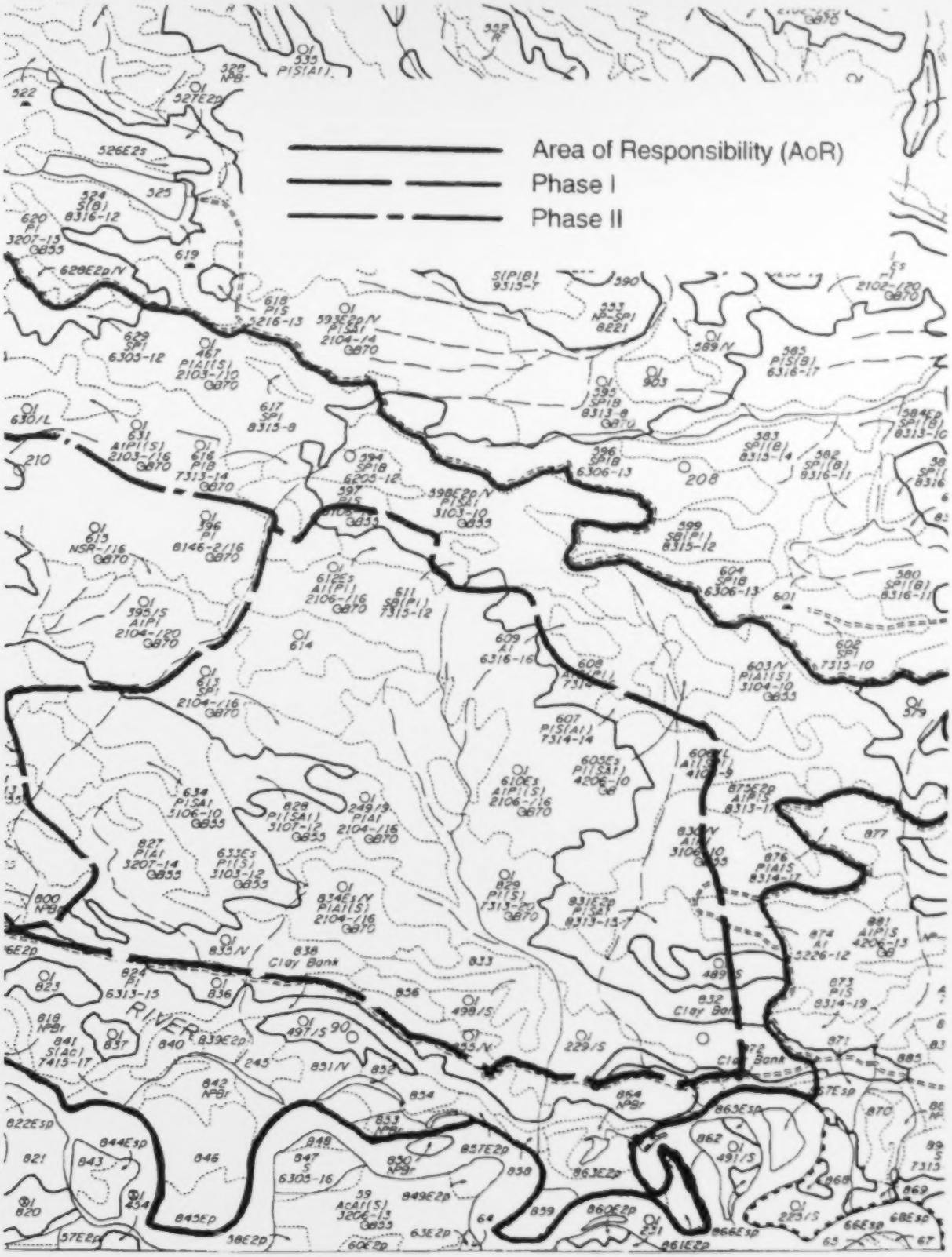
Hengeveld, P.E., and M.D. Wood. 2000. Ingenika River elk transplant: monitoring and evaluation. Peace/Williston Fish and Wildlife Compensation Program Report No. 208. 27pp plus appendices.

MacKinnon, A., C. DeLong, and D. Meidinger. 1990. A field guide for identification and interpretation of ecosystems of the northwest portion of the Prince George Forest Region. Land Management Handbook No. 21. BC Ministry of Forests, Victoria, B.C. 116 pp.

Zemlak, R.J., M.D. Wood, and F.B. Corbould. in prep. A review of habitat enhancement activities conducted in the Williston Reservoir watershed, 1989-1994. Peace/Williston Fish and Wildlife Compensation Program. 22pp.

Appendix A. Forest cover map of proposed Ingenika prescribed burn site: Area of Responsibility, Phase I (eastern section) and Phase II (western section) [scale 1:56,000 approximate].

151
R. 77
Clay Bank
Gravel Bar
Clay Bank
Clay Bank
Clay Bank
NP-SDPI
7221
NP-PISD
6241
NP-SDPI
6101
NP-SDPI
7221
NP-SD
7221


Area of Responsibility (AoR)
Phase I
Phase II
RIVER

Appendix B. Hourly weather readings from remote weather station located 6 km east of Ingenika River prescribed burn site: 13 to 17 May 2000.

Date	Time (PST)	Temp. (C)	R.H. (%)	Wind Speed (km/hr)	Wind Direction	Precip. (cm)
13-May	12:00	11.0	59	10.2	90	0
	13:00	11.4	57	7.4	135	0
	14:00	12.4	47	7.8	135	0
	15:00	12.5	47	3.0	135	0
	16:00	12.3	47	5.1	90	0
	17:00	11.3	52	6.4	90	0
	18:00	9.2	63	9.5	0	0
	19:00	9.0	66	1.9	315	0
	20:00	8.3	69	6.5	0	0
	21:00	7.7	71	5.8	315	0
	22:00	6.0	74	8.9	0	0
	23:00	4.7	85	8.9	90	0
14-May	0:00	3.7	92	0.0	90	0
	1:00	3.2	92	0.0	90	0
	2:00	1.9	99	0.0	90	0
	3:00	1.2	100	0.0	90	0
	4:00	0.3	100	0.0	90	0
	5:00	0.6	100	0.0	90	0
	6:00	1.0	100	0.0	90	0
	7:00	2.8	93	5.6	225	0
	8:00	5.4	84	6.1	225	0
	9:00	7.3	73	6.8	270	0
	10:00	7.5	64	5.3	180	0
	11:00	12.3	42	7.0	180	0
	12:00	12.5	36	9.5	225	0
	13:00	13.5	31	9.7	270	0
	14:00	13.3	30	6.3	270	0
	15:00	13.2	30	7.8	270	0
	16:00	13.7	29	10.9	270	0
	17:00	14.1	28	14.7	270	0
	18:00	13.7	29	7.9	270	0
	19:00	12.5	31	7.1	270	0
	20:00	11.0	34	5.0	315	0
	21:00	9.6	38	5.1	315	0
	22:00	8.3	43	3.8	315	0
	23:00	5.6	55	0.0	90	0
15-May	0:00	4.4	62	0.0	90	0
	1:00	4.3	62	0.4	90	0
	2:00	4.9	60	5.5	315	0
	3:00	4.2	64	2.2	270	0
	4:00	1.8	76	0.0	90	0
	5:00	2.0	76	0.0	90	0
	6:00	2.9	76	0.0	90	0
	7:00	4.4	73	0.0	90	0
	8:00	6.7	63	3.2	135	0
	9:00	8.7	59	2.8	135	0
	10:00	11.7	48	3.4	135	0
	11:00	13.4	36	7.6	135	0
	12:00	12.6	38	5.5	270	0
	13:00	12.6	39	3.9	90	0
	14:00	13.0	39	4.3	135	0
	15:00	12.5	40	5.3	225	0
	16:00	11.7	48	8.1	135	0
	17:00	11.6	48	4.8	90	0
	18:00	11.6	49	5.7	135	0
	19:00	10.4	54	2.2	90	0
	20:00	9.0	66	1.4	90	0
	21:00	6.5	80	4.2	90	0
	22:00	5.2	86	8.0	90	0
16-May	0:00	5.6	76	5.5	0	0
	1:00	5.7	74	3.3	45	0
	2:00	5.4	73	5.6	45	0
	3:00	4.9	73	3.3	90	0
	4:00	4.6	74	4.3	45	0
	5:00	4.6	72	2.8	45	0
	6:00	4.6	71	6.1	0	0
	7:00	5.1	64	3.8	45	0
	8:00	5.8	63	2.7	90	0
	9:00	6.6	57	2.6	90	0
	10:00	7.2	57	0.8	90	0
	11:00	8.3	53	2.8	180	0
	12:00	9.3	49	1.1	135	0
	13:00	10.5	47	5.0	180	0
	14:00	12.3	44	6.1	135	0
	15:00	13.4	41	5.4	135	0
	16:00	13.3	39	3.6	135	0
	17:00	11.7	42	6.0	90	0
	18:00	11.1	45	8.1	90	0
	19:00	10.6	46	5.8	90	0
	20:00	9.8	53	7.6	225	0
	21:00	7.5	74	1.0	315	0
	22:00	6.9	79	0.1	0	0
	23:00	6.0	84	1.0	45	0
17-May	0:00	5.6	87	1.9	45	0
	1:00	5.1	85	2.2	45	0
	2:00	5.1	85	5.3	0	0
	3:00	4.6	87	6.0	0	0
	4:00	3.9	94	0.0	270	0
	5:00	3.9	95	0.0	270	0
	6:00	4.3	97	0.0	270	0

Appendix C. Helicopter landing site co-ordinates, Ingenika River prescribed burn site.

Site No.[1]	Location	Latitude	Longitude
1	**North of Phase I:** on old cat trail, ~400 m N of northern perimeter	56 43.65	125 14.96
1a	**Phase I:** on new cat guard, NE corner (top of hand guard), east of 1b	56 43.32	125 14.39
1b	**Phase I:** on new cat guard, NE corner (top of hand guard), west of 1a	56 43.33	125 14.51
1c	**Phase I:** on new cat guard, mid-way along N perimeter (down ridge below #1d)	56 43.59	125 15.42
1d	**Phase I:** along new cat guard, NW corner (top of ridge)	56 43.72	125 15.55
2	**East of Phase I:** on old cat trail, mid-way up sidehill, ~500 m E of east flank	56 42.95	125 13.77
3	**Phase I:** on old road in SE corner	56 43.50	125 14.04
4	**Phase II:** on small rocky knoll, upper central area (~3/4 the way up sidehill)	56 43.74	125 17.49
4b	**Phase II:** on new cat guard, mid-way along N perimeter (on small ridge)		
5	**West of Phase II:** on old cat trail, west side of major draw (west of original boundary)	56 44.37	125 20.05
6a	**E/W divide:** on new cat guard, northern perimeter (bottom of draw just E of divide)	56 43.64	125 16.10
6b	**E/W divide:** on new cat guard, on small knoll ~2/3 way up sidehill (just above #6c)	56 43.45	126 16.55
6c	**E/W divide:** on new cat guard, on small knoll ~2/3 way up sidehill (just below #6b)	56 43.41	125 16.62
6d	**E/W divide:** on new cat guard, on rocky knoll ~1/3 way up sidehill (bend in creek)		
6e	**E/W divide:** on new cat guard, on small aspen knob ~1/4 way up sidehill,	56 43.00	125 17.07
6f	**E/W divide:** edge of terrace S of road (beside Isaac camp)	56 42.75	125 17.45
7a	**Phase II Section:** NW corner along creek draw		
7b	**Phase II Section:** NW boundary (east of #7a)		
8a	**Phase II:** SW corner near creek draw		
8b	**Phase II:** mid-way along E flank, near creek draw		
9a	**Phase II:** southern perimeter (ridge in front of wetland)		
9b	**Phase II:** midway along southern perimeter (elk antler pad)	56 43.25	125 18.48
9c	**Phase II:** southern perimeter (end of road)	56 42.98	125 17.96

[1] Sites identified with only a number were created using hand-tools and a chainsaw in 1998. Sites identified with a number and letter were created using a tractor in 2000.